



## Section 8: Appendices

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### A. GLOSSARY

Absorptive heating and cooling	Heating or cooling a space or item by moving heat from a low-temperature heat source to a higher-temperature heat sink. Renewable systems include air-coupled and ground-coupled heat pumps that use geothermal energy.
Agricultural residues	The non-food portion of a crop that can be used for cellulosic biofuels production and renewable electricity production. Examples include corn stover, wheat straw and rice husks.
Anaerobic digester	A facility that captures methane that is generated when biomass (usually animal waste) is broken down anaerobically (without the presence of oxygen). The methane, a potent greenhouse gas, is often run through a generator to produce electricity.
Animal agriculture residues	Animal manure from farms, cattle feed lots, and swine, poultry and other animal facilities. Often converted into methane using anaerobic digestion or processed into fertilizer.
B20	A blend of 20 percent biodiesel and 80 percent diesel, by volume.
Biobased products	Commercial or industrial goods (other than food or feed) composed in whole or in significant part of biological products, forestry materials or renewable domestic agricultural materials, including plant, animal or marine materials.
Biobutanol	A four-carbon alcohol produced from biomass with qualities very similar to gasoline.
Biocharcoal (Biochar)	A type of charcoal produced from biomass. In some cases, the term is used to distinguish biomass charcoal produced via a low-temperature burn process.
Biodiesel	A diesel fuel comprised of mono-alkyl esters derived from vegetable oils, animal fats and other biomass, designated B100 and meeting the requirements of ASTM D 6751. Biodiesel is typically produced by a reaction of a vegetable oil or animal fat with an alcohol such as methanol or ethanol in the presence of a catalyst to yield mono-alkyl esters and to remove glycerin.

Biofuel	Any liquid fuel produced from biomass. Biofuels sometimes are referred to as renewable fuels. However, renewable fuels also include biogas.
Biogas	Also known as renewable natural gas. A gas derived by processing manure and other organic matter in anaerobic digesters that is used as natural gas or to offset natural gas use.
Biogasoline	A fuel with the same properties as gasoline, but produced from renewable biomass.
Biomass	Any biological matter that is available on a renewable or recurring basis, including agricultural crops and trees, wood and wood wastes and residues, plants (including aquatic plants), grasses, residues, fibers, and animal wastes, municipal wastes, and other waste materials. (Adapted from the Billion Ton Study.)
Biopower	Electricity produced either wholly or in part from biomass.
Biorefinery	A facility that integrates biomass conversion processes and equipment to produce fuels, power and chemicals from biomass. (NREL)
British Thermal Unit (BTU)	A unit for measuring heat. A BTU is defined as the amount of heat required to raise the temperature of 1 pound of water by 1 degree Fahrenheit.
Carbon sequestration	Long-term storage of carbon in the terrestrial biosphere, underground or in the oceans.
Cellulosic ethanol/biofuels	Ethanol or biofuels made from cellulose and hemicellulose, typically from trees, grasses, corn stover and wheat straw.
Combined Heat and Power (CHP)	Also known as cogeneration. The process of generating electricity and thermal energy from a single fuel source. CHP is not a specific technology but an application of technologies to meet an energy user's needs. CHP systems dramatically improve efficiencies over separately producing heat and electricity.
Densification	A process for increasing the density of a material and shaping it as desired. Often used with agricultural products and residues, wood products such as slabs, chips, pellets or sawdust, and municipal solid waste for easier transportation and combustion.
Distillers Grains with Solubles (DGS)	The remaining nutrients – protein, fiber and oil – from processing grains for ethanol production. These co-products can be used to create livestock feed, usually after drying.
E85	A blend of 85 percent ethanol and 15 percent gasoline by volume.

Ethanol	A carbon alcohol usually produced by fermentation from biological materials such as sugars, starches and cellulosic feedstocks. Ethanol has a high octane content and traditionally has been used as an additive to gasoline.
Feedstock	Any crop grown to provide the raw material for producing biofuels, electricity, or other energy or biobased application or product.
Flexible-Fuel Vehicle (FFV)	A car or truck that can run on any blend of unleaded gasoline up to 85 percent ethanol (E85).
Forest fuel load	The amount of available and potentially combustible material in a forest, including live, dead and dying trees, undergrowth and forest debris.
Forest residues	Biomass material remaining in forests that have been harvested for timber. Timber harvesting operations do not extract all biomass material, because only timber of certain quality is usable in processing facilities. Therefore, the residual material after a timber harvest potentially is available for energy-generation purposes. Forest residues are composed of logging residues, rough rotten salvageable dead wood and excess small pole trees.
Forestry residues	Woody biomass remaining after harvesting or conversion, including forest residues, mill residues and other byproducts of the production of forestry product.
Green diesel	See "Biodiesel."
Green permitting	Expedited permitting processes for projects that include renewable energy or other environmentally beneficial elements. This provides developers and owners with an incentive to build green by streamlining the permit process timeline for their projects.
Mill residues	See "Urban wood waste and mill residues."
Municipal Solid Waste (MSW)	Garbage or refuse; sludge from a wastewater treatment plant, water supply treatment plant or air pollution control facility; and other discarded material, including solid, liquid, semi-solid or contained gaseous material resulting from industrial, commercial, mining and agricultural operations, and from community activities. This usually includes durable goods, non-durable goods, containers and packaging, food wastes and yard trimmings, and miscellaneous inorganic wastes.

Ocean energy	Tidal, wave or current power or thermal energy from the ocean. (Adapted from EPAAct 2005.)
Onsite energy use	Energy uses that generate electricity, steam, heat, cooling or power for immediate use in stationary equipment such as boilers, furnaces and spaces. This energy is not exported beyond a machine, building or other similar project boundary.
Plug-in Hybrid Electric Vehicle (PHEV)	A vehicle capable of operating for a limited range (e.g., 40 miles) on stored electrical energy in a battery that can be recharged from an external electrical outlet, and using an engine to achieve normal driving range (e.g., 400 miles) per tank of fuel.
Quad	A quad is a measure of energy equivalent to one quadrillion British Thermal Units (BTUs). About 4.4 million American households would consume a quad of energy through electricity and gasoline use in one year.
Renewable electricity	Electricity generated from renewable energy.
Renewable energy	Renewable energy is any source of energy that is naturally replenished, such as biomass, solar, wind, tidal, wave, geothermal and hydroelectric power, and is not derived from fossil or nuclear fuel.
Renewable Energy Certificates (RECs)	The renewable and environmental attributes of power produced from renewable energy projects that can be sold separately from the commodity electricity. Also known by terms such as green tags, renewable energy credits and tradable renewable certificates. (Adapted from EPAAct 2005.)
Renewable fuels	Motor vehicle fuels produced from grain, starch, oilseeds, sugarcane, sugar beets, sugar components, tobacco, potatoes, wood and other biomass; and natural gas produced from a biogas source, including a landfill, sewage waste treatment plant, feedlot or other place where decaying organic material is found. (EPAAct 2005)
Renewable natural gas	See "Biogas."

Short-rotation tree crops	High-yield, intensively managed forest plantations which reach maturity for energy harvest on a short-rotation basis, from as little as three to five years. These crops often can be harvested throughout the year and, when supplemented by natural forests, provide a continuously supplied inventory of biomass.
Solar energy	Energy radiated from the sun, mainly in the form of heat and light. This energy can be utilized by a variety of technologies, including but not limited to, photovoltaics, concentrating solar thermal plants and solar hot water applications.
Sustainability	To be a long-term solution for America, renewable energy production must conserve, enhance and protect natural resources and be economically viable, environmentally sound, and socially acceptable.
Thermal energy	Heat, including solar, biomass, geothermal, ocean and waste heat, that can be captured and used as an energy source.
Urban wood waste and mill residues	Waste wood materials that otherwise would be landfilled. Include primary mill residues; pallets; construction waste; demolition debris (excluding painted or treated wood); land clearing residues; utility line clearing and urban tree removals and tree trimming residues; and yard wastes.
Woody biomass	Any material produced by trees, bushes and shrubs in any form of processing (chips, sawdust, leaves, needles, etc.).
Yellow grease	Recycled or waste grease from restaurants that can be reprocessed into biodiesel. Also can refer to lower-quality grades of tallow from rendering plants.

## B. ECONOMIC STUDY RESULTS

### University of Tennessee Economic Analysis

The University of Tennessee study was designed to determine the feasibility of America's farms, ranches and forests providing 25 percent of U.S. total energy needs while continuing to produce safe, abundant and affordable food, feed and fiber. In addition, the analysis looked at the associated impacts of achieving the goal on the agricultural sector and the nation's overall economy. The 25x'25 Project Steering Committee established the 25x'25 vision and, along with Energy Future Coalition and the Energy Foundation, financed the study. The analysis was conducted by a team of professors and analysts from the University of Tennessee (UT) during 2005 and 2006.

### Key Findings of the UT Analysis

The UT economic analysis determined that America's farms, ranches and forests indeed can play a significant role in meeting the country's renewable energy needs. Moreover, the 25x'25 goal is achievable. Continued yield increases in major crops, strong contributions from the forestry sector, utilization of food processing wastes, as well as the use of more than 100 million acres of dedicated biomass energy feedstocks, will contribute toward meeting this goal. A combination of these new and existing sources can provide sufficient feedstock for the goal to be met. At the same time, the 25x'25 goal can be met while allowing the agricultural sector to reliably produce food, feed and fiber at reasonable prices.

According to the UT analysis, reaching the 25x'25 goal would have an extremely favorable impact on rural America and the nation as a whole. Including multiplier effects through the economy, the projected annual impact on the nation from producing and converting feedstocks into energy would be in excess of \$700 billion in economic activity and 5.1 million jobs by 2025, mostly in rural areas. The total addition to net farm income could reach \$180 billion as the

market rewards growers for producing alternative energy and enhancing our national security. In 2025 alone, net farm income would increase by \$37 billion compared with USDA baseline projections.

Another result of reaching the 25x'25 goal would be significant positive price impacts on crops. In the year 2025, when compared with USDA baseline projections, national average per-bushel crop prices are projected to be \$0.71 higher for corn, \$0.48 higher for wheat and \$2.04 higher for soybeans. The analysis also demonstrates that with higher market prices, an estimated cumulative savings in government payments of \$15 billion could occur.<sup>37</sup>

In the near term, corn acres are projected to increase. As cellulosic ethanol becomes commercially viable after 2012, the analysis predicts major increases in acreage for a dedicated biomass energy feedstock like switchgrass. However, higher crop prices do not result in a one-to-one increase in feed expenses for the livestock industry. Increases in ethanol and biodiesel production produce more distillers grains (DDGs) and soybean meal, which partially compensate for increased corn prices. Moreover, the integrated nature of the industry allows for the adjustment of animal inventories as a way to adjust to the environment and increase net returns. In addition, the production of energy from manure and tallow could provide additional value for the industry.

The UT economic analysis finds that contributions from America's fields, farms and forests could result in the production of 86 billion gallons of ethanol and 1.2 billion gallons of biodiesel, which has the potential to decrease gasoline consumption by 59 billion gallons in 2025. The production of 12.83 quads of energy from biomass and wind sources could replace the growing demand for natural gas and coal-generated electricity.

The complete study can be found at [www.25x25.org](http://www.25x25.org).

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<sup>37</sup> This does not include potential savings in fixed/direct or Conservation Reserve Program (CRP) payments.

## C. POLLING DATA

### The Public Overwhelmingly Supports 25x'25 and Renewable Energy

A national survey of 1,000 registered voters by Public Opinion Strategies found enormous support for 25x'25, a bold energy vision that would reduce our dependence on oil, protect the environment and public health, and provide a bright economic future for rural America:

- **There is nearly unanimous support for a national goal of having 25 percent of our domestic energy needs met by renewable resources by the year 2025.** Ninety-eight percent of voters see the 25x'25 goal as important for the country, and three out of four (74 percent) feel that it is “very important.” Ninety percent of voters believe this goal is achievable.
- **Overwhelming majorities support government action to encourage greater use of renewable energy.** Eighty-eight percent of voters favor financial incentives, and 92 percent support minimum government standards for the use of renewable energy by the private sector.
- **Nearly all voters (98%) say the costs would be worth it to move us toward the 25x'25 goal.** These include the cost of research and development, and the cost of building new renewable energy production facilities.
- **Voters consider energy to be an important issue facing the country, rating it similarly with health care, terrorism and national security, and education, and ahead of taxes and the war in Iraq.** Fifty percent of voters believe America is headed for an energy crisis in the future, and 35 percent believe the country already is facing a crisis.
- **Voters see many convincing arguments for a shift to renewable energy** – the need to reduce U.S. dependence on foreign oil, protection of the environment for future generations, the readiness of these technologies to contribute today, and the opportunities they present to create new jobs, especially in rural communities.

Public Opinion Strategies conducted a national internet survey of 1,000 registered voters on behalf of the Energy Future Coalition, which sponsored the research for the 25x'25 Work Group. The survey was conducted February 12-15, 2006, and has a margin of error of +/- 3.0 percent.

The complete executive summary of the poll is located online at [www.25x25.org](http://www.25x25.org).

## D. CONCURRENT RESOLUTION

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### CONCURRENT RESOLUTION

To Establish That it is the Goal of the United States of America to Derive 25 Percent of its Energy Use from Agricultural, Forestry and Other Renewable Energy Resources by 2025.

*Resolved by the Senate (The House of Representatives concurring)*

#### SECTION 1. FINDINGS AND PURPOSE

(a) The Congress finds that:

- (1) The United States has sufficient renewable energy resources to supply a significant portion of its energy needs.
- (2) America’s agricultural, forestry and working lands have the ability to play a major role in ensuring a sustainable domestic energy system.
- (3) Accelerated development and use of renewable energy technologies would benefit the Nation through
  - A. Improved national security.
  - B. Improved balance of payments.
  - C. Healthier rural economies.
  - D. Improved environmental quality.
  - E. Abundant, reliable, and affordable energy for all Americans.
- (4) The production of transportation fuels from renewable energy would help America meet rapidly growing domestic and global energy demands and reduce America’s dependence on energy imported from volatile regions of the world, whose political instability affects the cost and availability of energy and endangers the nation’s economy and security.
- (5) Increased energy production from domestic renewable resources would bring substantial new investments in energy infrastructure, creating economic growth, developing new jobs, and increasing farm, ranch and forestry income for rural America.
- (6) Increased use of renewable energy is practical and can be cost-effective today with supportive policies and comparable incentives to stimulate markets and infrastructure. Public policies aimed at enhancing renewable energy production and accelerating technological improvements will reduce costs further over time and increase market demand.

(b) The purpose of this resolution is to set a goal for America’s agricultural, forestry and working lands of developing new energy solutions for improving energy security, and to encourage the development of an integrated strategy to achieve that goal.

#### SEC. 2. NATIONAL RENEWABLE ENERGY GOAL

The Congress hereby establishes that it is the goal of the United States of America that by 2025, renewable energy from America’s agricultural, forestry and working lands will provide 25 percent of the total energy consumed in the United States from renewable sources while continuing to produce safe, abundant and affordable food, feed and fiber.

#### SEC. 3 DEFINITION

For purposes of this resolution, the term “renewable energy” means (1) solar energy; (2) wind energy; (3) hydropower; (4) wave or tidal energy; (5) biofuels and biomass; (6) geothermal energy; or (7) other energy resources that naturally replenish, utilize residual materials, or recycle waste.

## E. PARTICIPANTS

The *25x'25 Action Plan: Charting America's Energy Future* was written by the 28-member 25x'25 National Steering Committee in consultation with more than 400 25x'25 Alliance partners. The views and recommendations outlined in the Plan were drawn from discussions and consensus points that emerged from three 25x'25 Action Plan meetings and numerous meetings of five work groups that were formed to support the development of the plan. 25x'25 partners met in Washington in July 2006 to outline what would need to happen to get to a 25x'25 energy future. A second meeting of partners was held in Denver in September 2006 to flesh out specific policy initiatives needed to advance the vision. A draft report was circulated to partners for comment in December 2006 followed by a final 25x'25 partner meeting in Washington in January 2007. This meeting was held to review revised draft recommendations and solicit additional guidance and direction from alliance members. A final draft of the *25x'25 Action Plan* was circulated to 25x'25 partners in mid-February 2007, after which the report was finalized by the 25x'25 Steering Committee. The policy recommendations in the Plan should be attributed to the 25x'25 National Steering Committee rather than to individual Alliance partners.

### 25x'25 Work Groups

#### Renewable Fuels

Chair: Bill Horan

Staff: Reid Detchon and Jana Gastellum

#### Renewable Electricity

Co-chairs: Nathan Rudgers and Jerry Vap

Staff: David Gardiner and Rebecca Schlesinger

#### Extended Uses

Chair: Robert Foster

Staff: Peter Gage and Fred Deneke

#### Natural Resources

Co-chairs: Read Smith and Bill Richards

Staff: Gerald Talbert

#### Public Education and Outreach

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Staff: Diana Walker

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### Members of the following organizations provided valuable input to this report:

Agenda 2020 Technology Alliance, a Special Project of the American Forest & Paper Association

AgRefresh

Alabama Forestry Association

American Agriculture Movement

American Agri-Women

American Biofuels Development

American Biogas Alliance

American Council On Renewable Energy

American Farm Bureau Federation

American Farmland Trust

American Forest and Paper Association

American Loggers Council

American Renewable Energy Day

American Society of Agricultural and Biological Engineers

American Solar Energy Society

American Soybean Association

American Spirit Productions

American Wind Energy Association

Arkansas Association of RC&D Councils

Association of Equipment Manufacturers

Auburn University

BCS Incorporated

BioResource Management, Inc.

Cass County Electric Cooperative

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### **Members of the following organizations provided valuable input to this report:**

Agenda 2020 Technology Alliance, a Special Project of the American Forest & Paper Association

AgRefresh

Alabama Forestry Association

American Agriculture Movement

American Agri-Women

American Biofuels Development

American Biogas Alliance

American Council On Renewable Energy

American Farm Bureau Federation

American Farmland Trust

American Forest and Paper Association

American Loggers Council

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American Society of Agricultural and Biological Engineers

American Solar Energy Society

American Soybean Association

American Spirit Productions

American Wind Energy Association

Arkansas Association of RC&D Councils

Association of Equipment Manufacturers

Auburn University

BCS Incorporated

BioResource Management, Inc.

Cass County Electric Cooperative

Center for American Progress

Chippewa Valley Ethanol Co.

Colorado Farm Bureau

Colorado Harvesting Energy Network

Colorado Renewable Energy Society

Colorado State University

Colorado Working Landscapes

Corley Land Services

Council of Western State Foresters

Delta-Montrose Electric Association

Ecology Center

Energy Foundation

Environment Colorado/State PIRG

Environmental Defense

Environmental Law and Policy Center

Forest Energy Associates

Forest Energy Corporation

Forest Landowners Association

General Motors

Georgia Forestry Commission

Great Plains Institute

Gulf States Paper Company

Harvesting Clean Energy

Holistic Management International

Independent Bankers of Colorado

Intertribal Council on Utility Policy

Iowa Soybean Association

IQ Learning Systems, Inc.

Kansas Department of Agriculture

KEMA Consulting

Konrad Advising, LLC, and Colorado Renewable Energy Society

Louisiana Farm Bureau

Minnesota Department of Commerce

Minnesota Project

National Association of Conservation Districts

National Association of State Conservation Agencies